Use of an 'EZ-blocker' to facilitate thoracoscopic surgery in two dogs

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TITLE OF CASE ***Do not include "a case report"***
Use of an "EZ-Blocker" to facilitate thoracoscopic surgery in 2 dogs
SUMMARY ***Up to 150 words summarising the case presentation and outcome (this will be freely available online)***
This report documents the practical introduction of an EZ-blocker to achieve one-lung ventilation (OLV) in two medium-sized dogs for video-assisted thoracoscopic pericardectomy and right caudal lung lobectomy. Bronchoscopy was performed after blind introduction of the device through the endotracheal tube at the level of the tracheobronchial bifurcation. The EZ-blocker was successfully placed on the first attempt in the first case bur initially remained trapped in the Murphy eye of the endotracheal tube in the second case, requiring

repositioning. Surgical visibility was considered satisfactory when the left lung lobes were collapsed but not optimal when the right lung lobes had to be collapsed because the right cranial lung lobe could not be isolated for anatomical reasons. Both dogs recovered from anaesthesia uneventfully. Anaesthetic management with particular emphasis on the practical use of the EZ-blocker is reported. Placement of the EZ-blocker and challenges associated with right lung isolation are described.

BACKGROUND ***Why you think this case is important – why did you write it up?***

Repeated lung inflation may impair visualisation of the thoracic cavity during thoracoscopic procedures. A clear field is essential to avoid iatrogenic trauma and minimize surgical time (Radlinsky and others 2002, Mayhew and others 2009, Mayhew 2013). Lung isolation techniques can be used to facilitate one-lung ventilation (OLV) and allow collapse of one or multiple lung lobes. Different techniques of lung isolation have been described in dogs and include the use of endobronchial blockers (EBBs), selective endobronchial intubation (SEI), or double-lumen endotracheal tubes (DLTs), with each technique presenting specific limitations. The incidence of malposition is high and bronchoscopy is mandatory to guide device placement. (Klein and others 1998, Ruetzler and others 2011, Mourisse and others 2013).

Double-lumen tubes have successfully been used in dogs (Mayhew and others 2009, Adami and others 2011); however, they are designed for the human tracheobronchial tree and can only be used in the limited population of medium-sized dogs that have a similar diameter and length of the trachea. The tubes are also easily dislodge by positional changes of the animals(Jackson and others 1999).

An alternative is placement of a thin balloon-tipped catheter, an EBB, in a bronchus via a standard endotracheal tube. Compared to DLTs, EBBs provide a greater versatility over various patient sizes (Bradbrook and others 2012). However, leaks may occur at the connection port of the endotracheal tube and placement in the correct bronchus may be time consuming (Bauquier and others 2010).

A newer device has recently been marketed in the human field to achieve lung isolation. The EZ-Blocker (Rusch, Teleflex Life Sciences Ltd, Athlon, Ireland) (Fig. 1) is an EBB that is Y shaped at the distal end and designed to be placed at the level of the tracheobronchial bifurcation. Both extensions have inflatable cuffs with different colours to selectively block each of the main bronchi. The EZ-Blocker is versatile as an EBB but can be more easily inserted blindly through single lumen endotracheal tube (Mungroop and others 2010, Végh and others 2012). The potential for dislodgement during patient repositioning and surgical manipulations is lower (Mungroop and others 2010, Mourisse and others 2013, Kus and others 2014). Successful placement of the EZ-Blocker in dogs has been described

(Raszplewicz and others 2014).

This case report describes the anaesthetic management of two medium sized dogs requiring selective lune ventilation, with particular emphasis on the practical use of the EZ-blocker. The right lung was ventilated in the first case, the left lung and right cranial lobe in the second. We describe the placement of the EZ-blocker as well as the challenges associated with right lung isolation.

CASE PRESENTATION ***Presenting features, clinical and environmental history***

Case 1

A 11-year-old, castrated male Jack Russell Terrier weighting 11.5 kg was referred for investigation and treatment of pericardial effusion. The dog had undergone a splenectomy (benign hystiocytic lesion) 6 months before presentation and had no other relevant medical or surgical history. He was bright, alert and responsive. On physical examination, muffled heart sounds at auscultation was the only abnormality detected.

Case 2

A 14-year-old, intact male, Cocker Spaniel weighting 19 kg was referred for a one year history of lethargy and 6 weeks history of cough. Clinical examination was unremarkable.

INVESTIGATIONS ***If relevant***

Case 1

Cardiac ultrasound, thoracic and abdominal computed tomography were performed. Mild pericardial effusion and mild sternal lymphadenopathy were evident. Haematology and biochemical analysis were unremarkable.

Case 2

Chest radiographs and computed tomography showed a 7 cm mass in the caudal right lung lobe. Haematology and biochemical analysis showed mild anaemia (haematocrit 32%, hemoglobin concentration 110 g/L; reference intervals 39-57% and 138-204 g/L) and a mild elevation of glutamate dehydrogenase and lipase.

DIFFERENTIAL DIAGNOSIS ***If relevant***

Case 1

Idiopathic pericardial effusion was the most likely diagnosis.

Case 2

Neoplasia (adenocarcinoma, bronchoalveolar carcinoma, histiocytic sarcoma, other) was probable diagnosis, although granuloma or abscess were considered as differential diagnoses.

TREATMENT *If relevant*

Case 1

A thoraccoscopic-guided partial pericardectomy was performed. A 3-port technique was used with a paraxiphoid camera port and two instrument ports (one right, one left) between the fourthe and pericardial window creation between the fourth to sixth intercostal spaces. (Mayhew 2013). Right OLV was requested by the surgical team.

The dog was administered an intramuscular methadone (0.3mg/kg). An intravenous (IV) cannula was placed in the right cephalic vein 15 minutes after premedication. After pre-oxygenation, anaesthesia was co-induced with administration of an intial bolus of 1 mg/kg propofol IV, followed by 0.3mg/kg midazolam IV. Propofol was then titrated to effect (3 mg/kg additionally) untial the jaw tone was sufficiently reduced to allow endotracheal intubation (9.5 mm internal diameter cuffed tube). Anaesthesia was maintained with sevoflurane carried in oxygen and air (80% inspired fraction of oxygen). The dog was positioned in dorsal recumbency. Analgesia included a fentanyl intravenous infusion (5-10mcg/kg/hr). A single bolus of IV atracurium (0.3mg/kg IV) was administered in the operating theatre. Ampicillin (30mg/kg) was administered every 90 minutes.

At the beginning of anaesthesia the dog, breathing spontaneously, was positioned in dorsal recumbency. A multiport adaptor was connected to the proximal end of the endotracheal tube. The insertion length of a 7 Fr. EZ-blocker (Rusch, Teleflex Life Sciences Ltd, Athlon, Ireland) was visually estimated (distance between the rostral extremity of the connector and the 4^{th} to 5^{th} intercostal space) and inserted blindly through the adaptor and into the trachea until resistance was felt. Fibre-optic video-brochoscopy () was used to confirm adequate positioning, identify and record the orientation of the cuffs (i.e. which coloured cuff was in each bronchus) and confirm the functionality of the cuffs (inflation of the cuff and observation of the degree of bronchus occlusion).

Mechanical ventilation was initiated when the dog was transferred to the operating theatre (Datex-Ohmeda, Aespire Anaesthesia Machine, Finland) using a volume-controlled mode with an initial tidal volume (V_T) of 10 ml/kg, a respiratory rate (fR) of 15 breaths/minute and positive end-expiratory pressure (PEEP) of 5 cmH_2O.

After positioning of the thoracoscopy equipment, the cuff in the left mainstem bronchus was inflated. The right lung was ventilated with an initial respiratory rate of 25 breaths/minute, PEEP of 5 cmH_2O and a V_T of 7ml/kg resulting in a peak inspiratory pressure (PIP) of 14 cmH_2O. Subsequently, V_T and fR were adjusted to maintain $PE'CO_2$ and arterial blood gas analysis values within clinically acceptable ranges. The deflation of the non-ventilated lung was observed thoracoscopically. It was kept slightly expanded by of oxygen (1 L/minute) through a Bain breathing system with the APL valve partially closed generating a continuous positive airway pressure (CPAP) of approximately 3 cmH_2O connected to the proximal port of the EZ-blocker.

Jaw and muscular tone, palpebral reflexes, eye position, peripheral pulses quality, mucous membrane colour and capillary refill time were continuously assessed. Physiologic variables were recorded at 5 minute intervals. A multiparametric anaesthesia monitor was used to measure saturation of arterial haemoglobin with oxygen (SpO_2), heart rate and rhythm, $PE'CO_2$, gas analysis, spirometry and invasive blood pressure (an arterial catheter was placed in the right dorsal metatarsal artery). Arterial blood gases were analysed at clinically relevant intervals (before the initiation of OLV, 5 minutes after beginning of OLV, every 15 to 20 minutes during OLV, once the collapsed lung was recruited, before and after recovery from anaesthesia). Neuromuscular block was monitored using a train-of-four pattern with the electrodes situated over the facial nerve.

After successful completion of the surgery, a thoracic drain was place via thoracoscopic guidance. The cuff of the EZ-blocker was deflated and a few breath holds at PIP of 20 cmH_2O for 5 seconds to recruit the collapsed lung lobes.

Glycopyrrolate (0.01mg/kg) and neostigmine (0.02mg/kg) were administered intravenously to reverse neuromuscular blockade at the end of the procedure.

Case 2

A right caudal lung lobectomy was scheduled. Surgical approach was similar to case 1 but OLV had to be provided to the left lung with collapse of the right lung lobes to facilitate surgery.

Anaesthesia protocol, monitoring and management were similar to case 1. The trachea was intubated with an 11.0 mm internal diameter cuffed endotracheal tube was placed.

Two attempts were made to place the EZ-blocker in this case. The first one resulted into an incorrect positioning of the device with the Y-shaped end of the device trapped into the Murphy's eye at the distal end of the endotracheal tube. This was observed fibre-optic video-bronchoscopy (Fig. 2). The EZ-blocker was withdrawn and re-inserted successfully. During brocnchoscopic evaluation, it was evident that the right cranial lung lobe could not be isolated because its bronchus originated above the bifurcation (the location of the EZ-blocker).

The animal was ventilated in a similar fashion to case 1, however, CPAP to the right lung was not applied as the cranial lobe was still ventilated and the caudal lobe had to be surgically removed.

OUTCOME AND FOLLOW-UP

Nasal cannulas were placed for oxygen delivery after anaesthesia. The arterial cannula was kept in place to allow arterial blood gas monitoring during the recovery and post-operative phase. Bladders were expressed before recovery.

Both dogs recovered well from anaesthesia and were observed in intensive care for 24 hours. A particular attention was given to the respiratory monitoring. Respiratory rate and effort were assessed every 15 minutes during the first 4 hours after anaesthesia. A SpO_2 probe was placed on the tongue of the dogs until no longer tolerated. Arterial blood gases was measured 1 and 4 hours after extubation, to titrate nasal oxygen administration and assess ventilation. Nasal oxygen administration was discontinued approximately 6 hours after extubation. Fifteen minutes after discontinuation, an arterial blood gas confirmed a PaO_2 > 80 mmHg and the arterial cannulas were removed.

Pain was assessed postoperatively every hours for 4 hours then every 4 hours using the short form of the Glasgow composite pain scale (CMPS-SF) which ranging from 0 (no pain) to 24 (severe pain) (Reid and others 2007). Postoperative analgesia included IV methadone every 4 hours for the first 24 hours then IV buprenorphine every 6 ours until discharge. Meloxicam was also administered once daily (0.1mg/kg IV). An appropriate rescue analgesia plan was communicated by the anaesthetists to the intensive care team.

Chest tubes were removed on the day following surgery and the dogs were returned to their owners two days after the procedure with oral meloxicam (0.1mg/kg) once daily.

DISCUSSION ***Include a very brief review of similar published cases***

The EZ-Blocker was successfully used to provide right OLV in the first case and surgical visualisation was considered very satisfactory by the surgical team. In the second case, the right cranial lung lobe could not be isolated. Visualisation of the thoracic cavity during surgery was sufficient but not optimal.

Several devices have been described to selectively ventilate lungs of the dog. Double-lumen tubes have been described to achieve lung separation and OLV in canine patients undergoing thoracoscopy in previous studies. Good control of ventilation to both lungs and easy access to the non-ventilated lung for CPAP administration are possible (Mayhew and others 2009, Adami and others 2011). However, there are a limited number of available sizes and they are designed for the human tracheobronchial tree. This restricts their use to a limited population of medium sized dogs (Campos 2007, Purohit and others 2015). Their placement can also be challenging or unsuccessful. In a previous study, DLTs could not be properly inserted in 3 out of 13 dogs undergoing thoracoscopic partial pericardiectomy (Jackson and others 1999). Endobronchial blockers are a more versatile alternative for OLV. Different designs and sizes are available (wire-guided endobronchial blocker, Arndt blocker, Cook Critical Care, etc). They may be adapted for use in large dogs (Bauquier and others 2010, Bradbrook and others 2012) and tracheas intubated with endotracheal tubes as small as 4.5 mm (Bauquier and others 2010). Usually, the trachea is intubated with a standard endotracheal tube before advancing an EBB into a bronchus under direct bronchoscopic guidance. The blockers needs to be inserted specifically in the main bronchus to be blocked which may be time consuming. The incidence of intraoperative displacement is higher compared with DLT (Narayanaswamy and others 2009, Purohit and others 2015). Visualization can be limited by haemoptysis and EBBs should not be used in case of lung bleeding when the bleeding side of lung is unknown (Campos 2003, Anantham and others 2005). Once an EBBs is placed, monitoring the collapsed lung is difficult. Single-lumen endotracheal tubes of small diameter can be used as an endobronchial tube to selectively infubate ong lung. The healthy lung can then be completely isolated from the diseased lungs (Brodsky 2009, Purohit and others 2015).

The use of an EZ-Blocker appears to be a useful alternative to DLT and EBB in small animals. It can be placed rapidly and suits a wide range of animals because it adapts to any endotracheal tube with internal diameter of more than 7.0 mm. (Mungroop 2008, Mungroop and others 2010, Mourisse and others 2013, Raszplewicz and others 2014). The two distal cuffs allow isolation of either lung independently without need to repeat video-bronchoscopy. This may be an advantage when performing, for instance, bilateral thoracoscopic procedures (eg. pericardectomy). Moreover, the two central lumens, in the blocker, allow access to the non-ventilated lung for aspiration and/or application of continuous positive airway pressure (CPAP). Application of CPAP to the non-ventilated lung has been suggested to reduce hypoxemia and atelectasis and contribute to a protective lung-ventilation strategy (Grichnik and Shaw 2009, Rozé and others 2011). During OLV, the functional residual capacity decreases and shunt fraction increases because of the lung collapse. Development of hypoxaemia is therefore more likely. Applying CPAP with 100% oxygen may help reduce the magnitude of hypoxaemia in those animals and this has been described in a dog with a DLT (Adamia and others 2011). However, to our knowledge, the use of CPAP through an EZ-blocker has not been described in dogs though it was described as successful in a human case report (Calenda and others 2016). Although CPAP has been shown to help management of hypoxaemia during OLV, it must be used cautiously as it has the potential to impair the visualization of the surgical field during thoracoscopy.

The EZ-blocker can be advanced blindly through the endotracheal tube until resistance is felt when the endobronchial extensions reach the tracheal bifurcation. Measurement of the approximate length of the trachea is recommended. Excessive advancement of the blocker within the bronchial tree could result in both extensions entering the same bronchus and causing bronchial damage. Positioning the dog in dorsal recumbency with the distal Y shaped end oriented in a plane parallel to table may help to reduce the risk of this complication.

Only short duration bronchoscopy is required to confirm appropriate orientation and placement of the blocker and to check of the adequate function of the cuffs. This is an advantage compared to the other techniques. In one of the cases presented here, one extension of the EZ-blocker was trapped in the murphy's eye of the endotracheal tube. This underlines the necessity of bronchoscopic verification before use of the EZ-blocker (Slinger, 2003, Knoll and others, 2006, Campos, 2007, Ruetzler and others, 2011).

One limitation of the EZ-blocker is that it only allows blockade of the mainstem bronchi. Due to specific canine anatomy of the bronchial tree, the right cranial lung lobe cannot be isolated in most patients (as in case 2) because it originates in the trachea above the main bronchial bifurcation. Another limitation is that only one size of is available (7 French). This may not be suitable for small patients.

Advantages of the EZ-blocker include ease of insertion, potential ability to switch side of OLV, possibility to deliver CPAP to the collapsed lung and applicability to a size range of animals wider than DLTs. Disadvantages include potential inability to collapse the right cranial lung lobe in dogs and large size for small animals. It does represent however an easy and effective alternative to provide OLV in dogs undergoing thoracoscopic exploration or surgery.

LEARNING POINTS/TAKE HOME MESSAGES *3 to 5 bullet points – this is a required field*

- One lung ventilation in dogs can be achieved using the EZ-blocker
- Blind placement is easy and feasible but endoscopic visualisation of correct placement and orientation of the device is necessary
- In dogs it might not be possible to achieve collapse of the right cranial lobe

REFERENCES *Harvard style*

Adami, C., Axiak, S., Rytz, U. & Spadavecchia, C. (2011) Alternating one lung ventilation using a double lumen endobronchial tube and providing CPAP to the non-ventilated lung in a dog. *Veterinary Anaesthesia and Analgesia* 38**,** 70-76

Anantham, D., Jagadesan, R. & Tiew, P. E. (2005) Clinical review: Independent lung ventilation in critical care. *Critical Care,* 9**,** 594-600.

Bauquier, S. H., Culp, W. T., Lin, R. C. & Larenza, M. P. (2010) One-lung ventilation using a wire-guided endobronchial blocker for thoracoscopic pericardial fenestration in a dog. *Canadian Veterinary Journal* 51**,** 1135-8

Bradbrook, C., Clark, L., Mosing, M. (2012) Use of an Endobronchial Blocker and

Selective Lung Ventilation to Aid Surgical Removal of a Lung Lobe Abscess in a Dog. *Case Reports in Veterinary Medicine 2*012**,** Article ID 926803

Brodsky, J. B. (2009). Lung separation and the difficult airway. *British Journal of Anaesthesia* ,103 Suppl 1, i6 6-75.

Calenda, E., Baste, J. M., Bergis, A., Hobeika, S. & Peillon, C. (2016) Constant positive airway pressure easily connected to an EZ blocker channel. *Journal of Clinical Anesthesia,* 28, 92-4.

Campos, J. H. (2007) Which device should be considered the best for lung isolation: double lumen endotracheal tube versus bronchial blockers. *Current opinion in anaesthesiology* 20**,** 27-31

Grichnik, K. P. & Shaw, A. (2009). Update on one-lung ventilation: the use of continuous positive airway pressure ventilation and positive end-expiratory pressure ventilation clinical application. *Current opinion in anaesthesiology,* 22**,** 23-30

Jackson, J., Richter, K. P. & Launer, D. P. (1999) Thoracoscopic partial pericardiectomy in 13 dogs. *Journal of Veterinary Internal Medicine* 13**,** 529-33

Klein, U., Karzai, W., Zimmermann, P., Hannemann, U., Koschel, U., Brunner, J. X. & Remde, H. (1998) Role of fiberoptic bronchoscopy in conjunction with the use of double lumen tubes for thoracic anesthesia: a prospective study. *Anesthesiology* 88**,** 346-50

Knoll, H., Ziegeler, S., Schreiber, J. U., Buchinger, H., Bialas, P., Semyonov, K., Graeter & Mencke, T. (2006) Airway injuries after one-lung ventilation: A comparison between double-lumen tube and endobronchial blocker - A randomized, prospective, controlled trial. *Anesthesiology* 105**,** 471-477

Kus, A., Hosten, T., Gurkan, Y., Gul Akgul, A., Solak, M. & Toker, K. (2014) A comparison of the EZ-Blocker with a Cohen Flex-Tip blocker for one-lung ventilation. *J Cardiothorac Vasc Anesth,* 28**,** 896-9.

Mayhew, K. N., Mayhew, P. D., Sorrell-Raschi, L. & Brown, D. C. (2009) Thoracoscopic Subphrenic Pericardectomy Using Double-Lumen Endobronchial Intubation for Alternating One-Lung Ventilation. *Veterinary Surgery,* 38**,** 961-966.

Mayhew, P. D. (2013). Surgical views: thoracoscopy: basic principles, anesthetic concerns, instrumentation, and thoracic access. *Compendium,* 35**,** E3.

Mourisse, J., Liesveld, J., Verhagen, A., Van Rooij, G., Van Der Heide, S., Schuurbiers Siebers, O. & Van Der Heijden, E. (2013) Efficiency, efficacy, and safety of EZ-blocker compared with left-sided double-lumen tube for one-lung ventilation. *Anesthesiology,* 118**,** 550-61.

Mungroop, H., L. B., Huyzen, R., Nijmeier A, Epema A. (2008) A novel method of lung isolation using a novel bronchial blocking device. *European Journal of Anaesthesiology,* 25**,** 255.

Mungroop, H. E., Wai, P. T., Morei, M. N., Loef, B. G. & Epema, A. H. (2010) Lung isolation with a new Y-shaped endobronchial blocking device, the EZ-Blocker. *British journal of anaesthesia,* 104**,** 119-20.

Narayanaswamy, M., Mcrae, K., Slinger, P., Dugas, G., Kanellakos, G. W., Roscoe, A. &

Lacroix, M. (2009) Choosing a lung isolation device for thoracic surgery: a randomized trial of three bronchial blockers versus double-lumen tubes. *Anesthesia and Analgesia,* 108**,** 1097-101.

Purohit, A., Bhargava, S., Mangal, V. & Parashar, V. K. (2015) Lung isolation, one-lung ventilation and hypoxaemia during lung isolation. *Indian journal of anaesthesia,* 59**,** 606-17.

Radlinsky, M. G., Mason, D. E., Biller, D. S. & Olsen, D. (2002) Thoracoscopic visualization and ligation of the thoracic duct in dogs. *Veterinary surgery : VS,* 31**,** 138-46.

Raszplewicz J, K. a. M. M. (2014) One-lung ventilation in four dogs using a Y-shaped bronchial blocker (EZ-B). *Veterinary Anaesthesia and Analgesia,* 41**,** 550-561.

Reid, J. N., A.M., Hughes,J.M.L., Lascelles,D., Pawson,P. , Scott,E.M. (2007) Development of the short-form Glasgow Composite Measure Pain Scale (CMPS-SF) and derivation of an analgesic intervention score. *Animal Welfare,* 16**,** 97-104.

Roze, H., Lafargue, M. & Ouattara, A.(2011) Case scenario: Management of intraoperative hypoxemia during one-lung ventilation. *Anesthesiology,* 114**,** 167-74.

Ruetzler, K., Grubhofer, G., Schmid, W., Papp, D., Nabecker, S., Hutschala, D., Lang, G. & Hager, H. (2011) Randomized clinical trial comparing double-lumen tube and EZ-Blocker (R) for single-lung ventilation. *British journal of anaesthesia,* 106**,** 896-902.

Slinger, P. (2003) A view of and through double-lumen tubes. *Journal of Cardiothoracic and Vascular Anesthesia,* 17**,** 287-8.

Végh , T., Juhasz, M., Enyedi, A., Takacs, I., Kollar, J. & Fulesdi, B. (2012) Clinical experience with a new endobrochial blocker: the EZ-blocker. *Journal of Anesthe*26**,** 375-80.

FIGURE/VIDEO CAPTIONS ***figures should NOT be embedded in this document***

Fig 1. EZ-blocker distal Y-shaped end trapped in the Murphy eye of the orotracheal tube of a dog undergoing OLV for thoracoscopic surgery at the first attempt of insertion of the device.

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